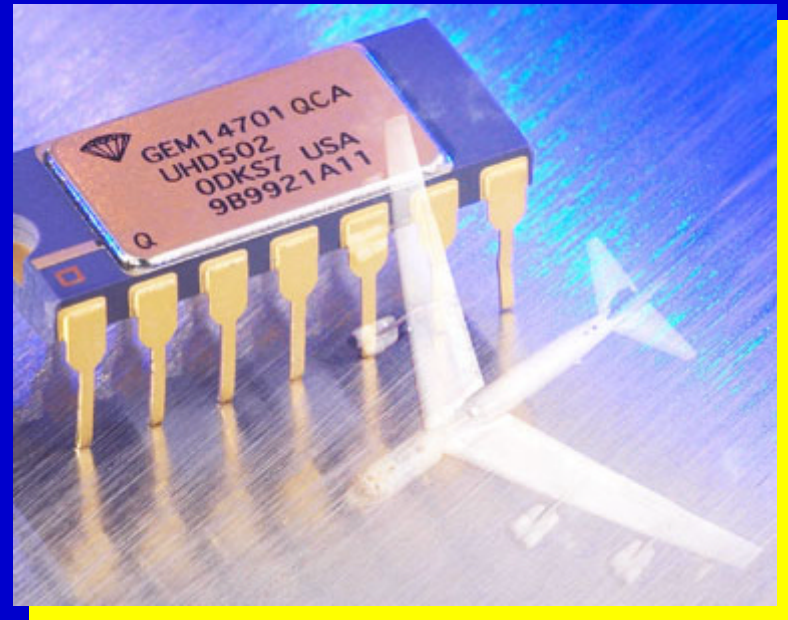


Supporting Legacy Systems with the Generalized Emulation of Microcircuits (GEM)



Justine Corboy
Sarnoff Corporation
October 23, 2002

5th Annual Systems Engineering Conference



Defense Supply Center Columbus
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Outline

- ◆ What is DMSMS?
- ◆ Government/Industry Partnership
- ◆ What is GEM/AME?
- ◆ Weapon Systems DMS Activities and How GEM/AME Support Them???
- ◆ Conclusion



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What is Diminishing Manufacturing Sources and Material Shortages (DMSMS)?

- ◆ DoD Definition: The loss or impending loss of the manufacturer or supplier of raw material, production parts or repair parts.
- ◆ Industry Definition: The loss or impending loss of the original manufacturer or supplier of raw material, production parts or repair parts.
- ◆ Obsolete Part: A part of a larger system that is no longer manufactured by the original manufacturer.
 - Commodities affected by DMSMS
 - microelectronics 83%
 - others 17% (based on 1999 GIDEP submittals)



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Government/Industry Partnership

...for over 15 years...

◆ Defense Logistic Agency (DLA)

- Manages the Emulation R&D Program, Advanced Microcircuit Emulation (AME)
- Continually expanding the technology

◆ Defense Supply Center Columbus (DSCC)

- Manages the Emulation Production Program, Generalized Emulation Microcircuits (GEM)
- Ensuring a continuing source of manufacturing capabilities and microcircuits

◆ Sarnoff Corporation

- Develops and manufactures emulation products & technologies
- In-house integrated circuit, design, fabrication and test capabilities

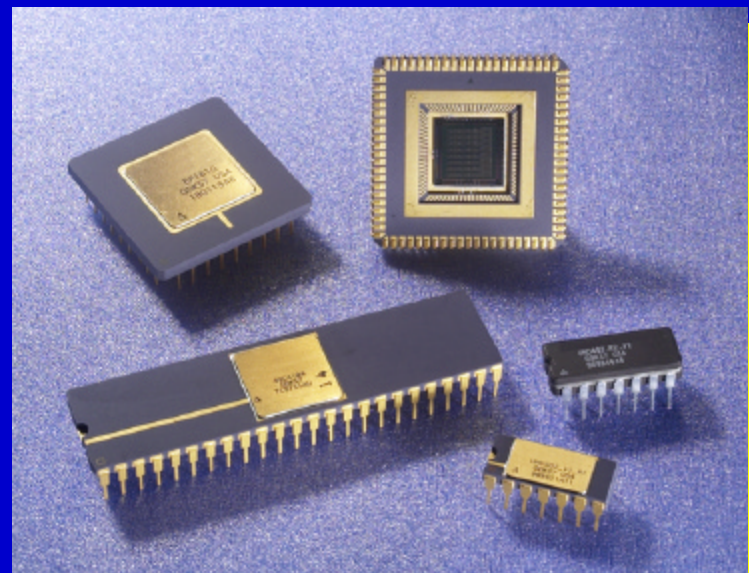


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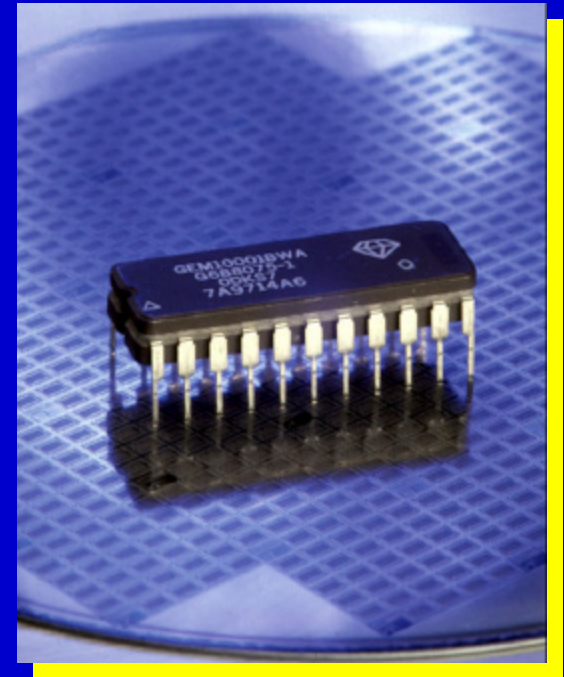
Generalized Emulation of Microcircuits

...a continuing source... a proven solution...

What is Emulation?

◆ Production of a microcircuit which is

- FORM
 - Same package/same part number/
same pinout
- FIT
 - Meets all specified parameters over
temperature and voltage (including
selected items)
- FUNCTION
 - Satisfies functional and test vector sets



What is Generalized Emulation?

- ◆ One basic process/multiple arrays
- ◆ Not dependant on die or photomasks from original manufacturer



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Generalized Emulation of Microcircuits

...a continuing source... a proven solution...

◆ GEM technology

- Supply voltage up to 20V
- Output voltage up to 100V
- Typical propagation delays of 5 ns (TTL) / 3 ns (ECL)
- CMOS or bipolar technology
- Total pin count up to 48

◆ Families supplied

- TTL, DTL, HTTL, LTTL, LSTTL - 54/54H/54L/54LS/ 54S/ 25LLS/Sxx/74s/Sxx/93xx/93Lxxx
- ASIC/PALs
- CMOS - 4xxx
- Bit Slice Microprocessors (29xx)
- Timer/Counter
- 100 Volt Outputs (UHD)
- ECL - 10K
- NMOS
- System specific parts



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Generalized Emulation of Microcircuits

...a continuing source... a proven solution...

◆ Device types

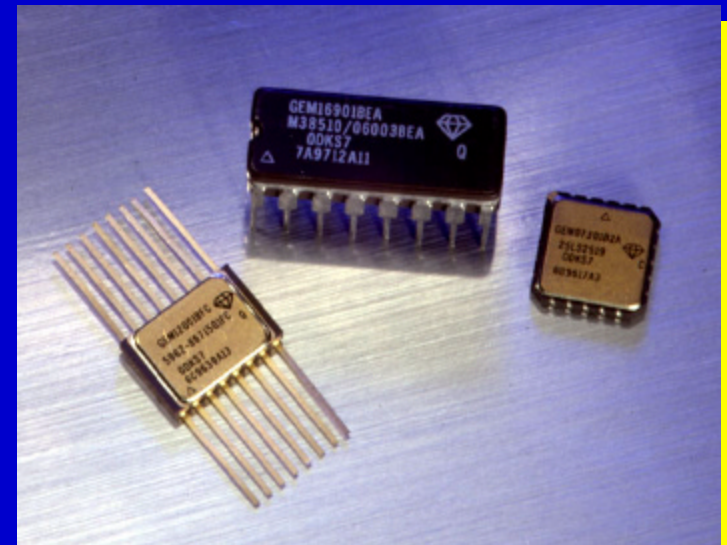
- Manufacture military quality digital microcircuits
- More than 735 microcircuit types available
 - Production on demand
 - Residual inventory
- More than 45,000 parts delivered
- Flexible technology
 - Accommodates small volume
 - Can be tailored

◆ Maintain quality requirements

◆ Minimal documentation changes

◆ Life-long system support

◆ Permanent, one-time solution – no end-of-life notices

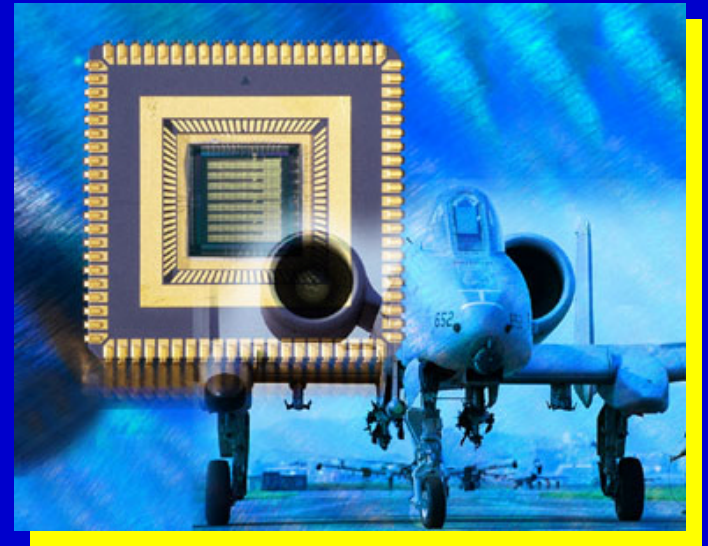


GEM breaks the obsolescence cycle

Advanced Microcircuit Emulation

...a program to develop capabilities...

- ◆ Building on the proven GEM model, adapt modern microcircuit manufacturing and design processes to emulate complex microcircuits
- ◆ Positions Emulation to support the range of requirements from piece-part replacement to board-level and/or full system upgrades
- ◆ Scope: Advanced digital devices, microprocessors/microcontrollers, analog, hybrids, memory, engineering services on assemblies using AME technology elements



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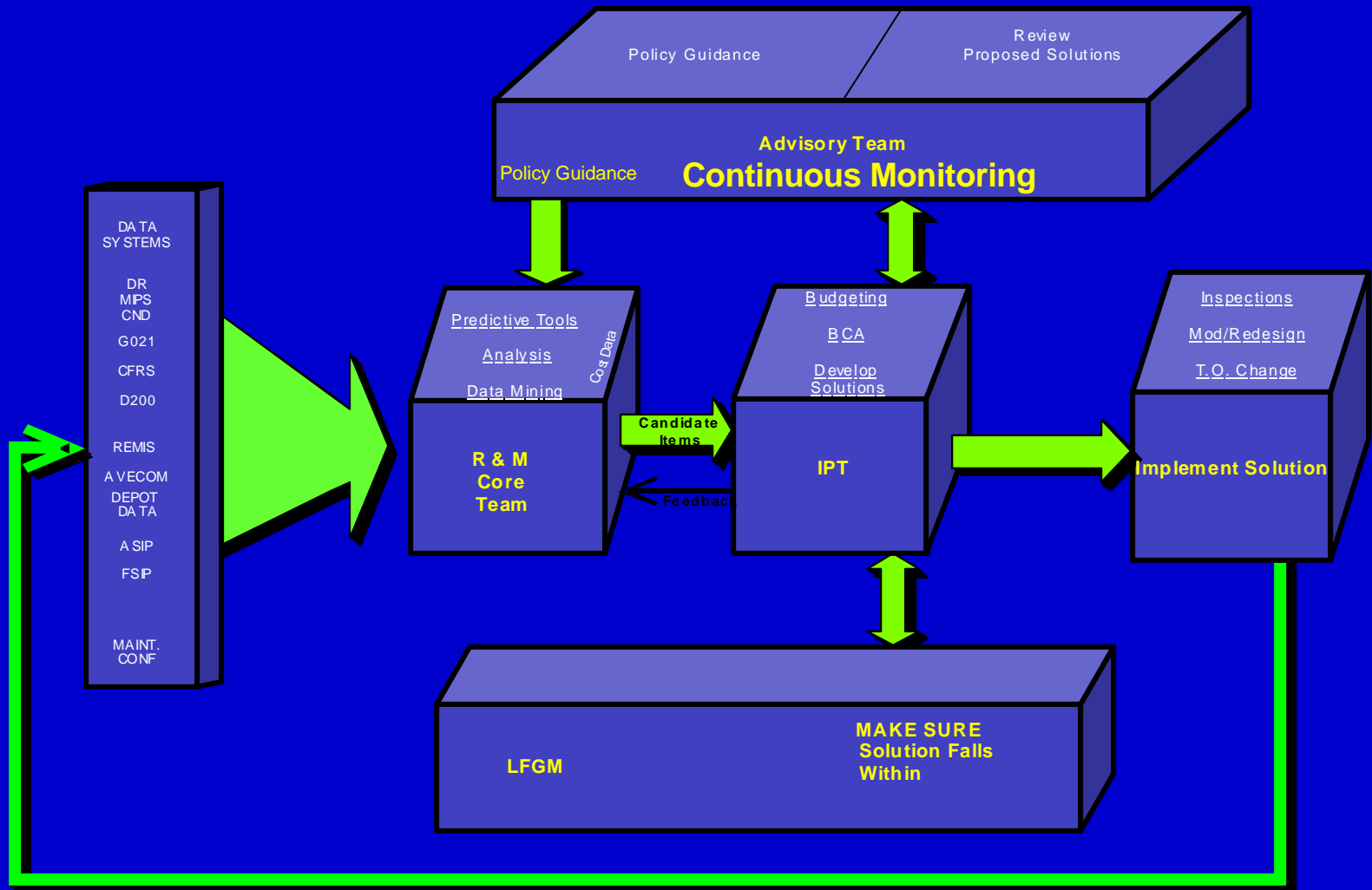
“One Person Obsolescence Team”



Drowning in a sea of obsolete microcircuits

Multi Organizational Obsolescence Team

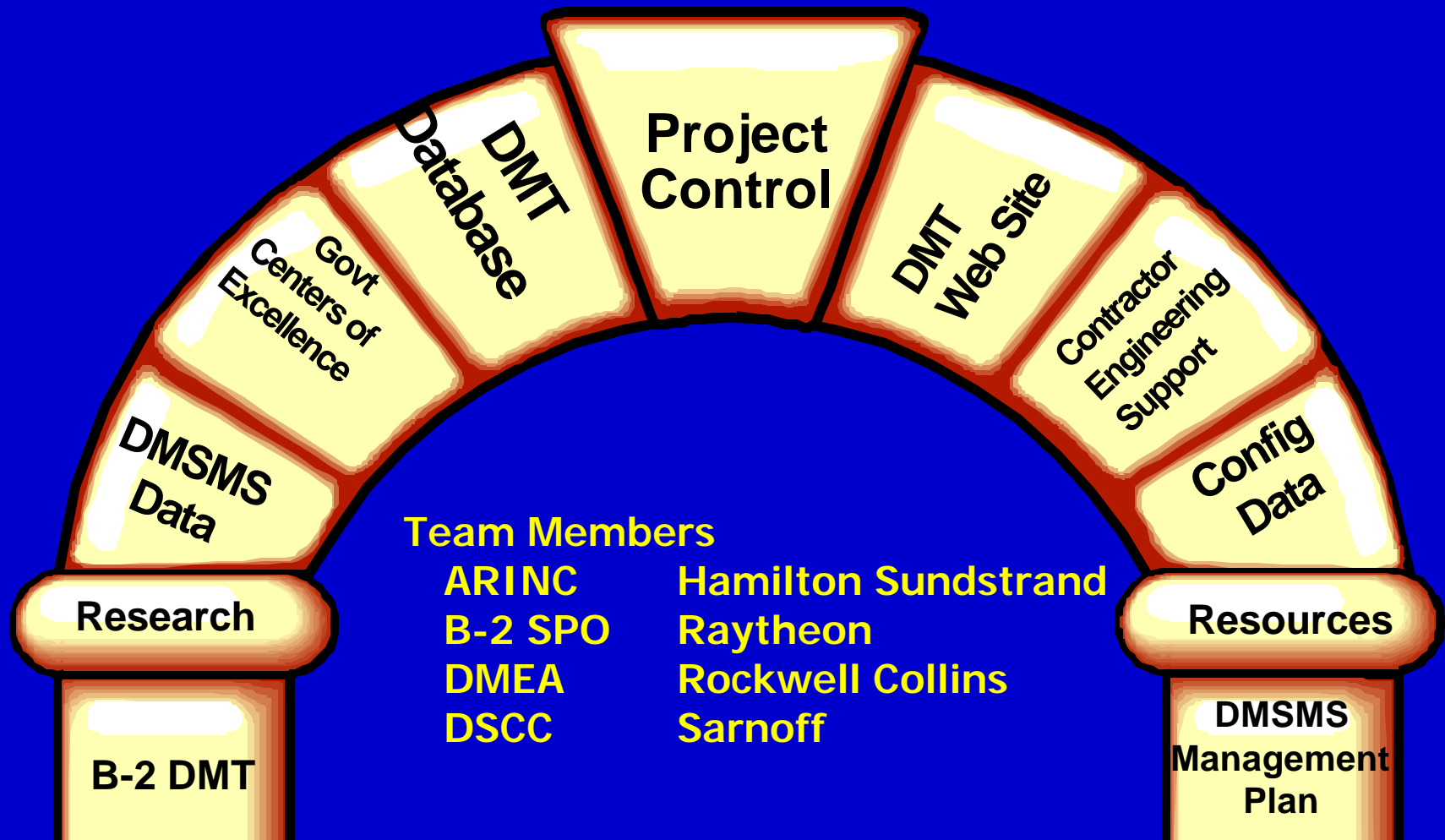
F-15 LF R&M Process Flow



Multi Organization Obsolescence Team

B-2 DMS Process

... building blocks of the B-2 proactive approach...



Supporting Weapon Systems with GEM

...multiple support options...

◆ Option One – Order as Required

- GEMed parts listed on GEM website – SMD's and M38510's
- Send us RFQ when you need a part
- Solicit DSCC DMS Office

◆ Option Two – Parts Lists/BOM reviews

- Parts Lists/BOM's can be evaluated for "GEMability"
- Provide list of red/yellow parts for review
- Provide complete Bill of Materials for review



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Supporting Weapon Systems with GEM

...part list analysis...

- ◆ We have a “GEMability” database
- ◆ Run the lists provided against the GEM database
- ◆ Provide a “GEMability” status column
- ◆ Not 100% accurate
 - “GEMability” determined by reviewing drawings or in most cases by technology and functional descriptions
- ◆ This is meant to provide the DMS Manager with a FIRST LEVEL REVIEW
- ◆ Provide DLA/DSCC with technologies to target for development



Supporting Weapon Systems with GEM

...part list analysis...

◆ “GEMability” Categories

- GEMed
- GEMable
- Emulation Development In Process
- Technology Development
- Not GEMable
- Not currently in our database



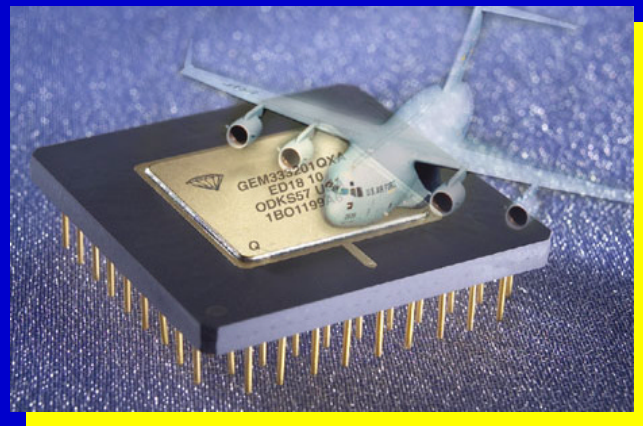
Supporting Weapon Systems with GEM

...part list analysis...

◆ If GEM is determined to be the required solution we then review the documentation

- Confirm "GEMability"
- Determine if a bridge buy is required
- Work with DLA/DSCC

Emulation Program Offices and the DSCC DMS Program Office to develop a long-term proactive solution/plan



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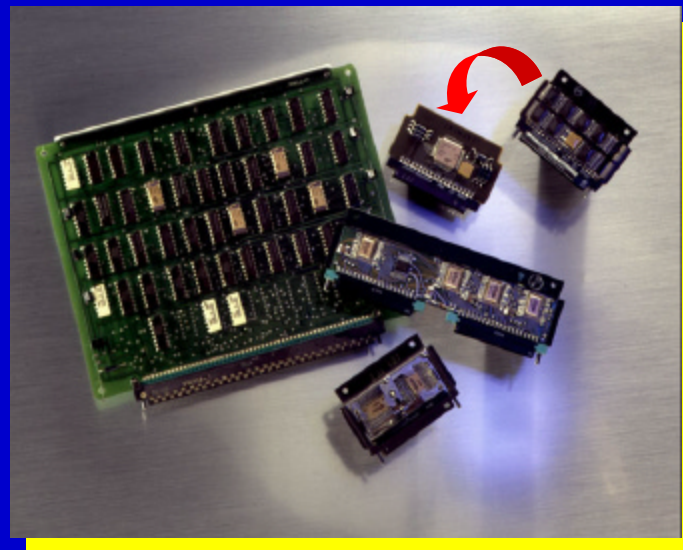


Supporting Weapon Systems with GEM

... multiple support options...

◆ Option Three – Design Out Obsolescence

- Use GEM/AME technology to:
 - Replace multiple parts on a board
 - Support system upgrades
- Third Party design centers
 - Beta design sites established
 - Designed drop in replacements for complex digital parts
 - Designed AME ASICs for new systems
 - Replaced all microcircuits on a board with two AME ASICs



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Supporting Weapon Systems with GEM

... mitigate obsolescence impacts...

- ◆ GEM/AME provides a long-term, continuing source for sustainment and production requirements
- ◆ Emulation analysis of a systems bill of materials augments the development of a long-term platform support strategy
- ◆ Millions in cost avoidance reported from several different programs



...used proactively in conjunction with planned system upgrades, emulation leads to long-term support and total ownership cost reductions....

Contacts

◆ Defense Logistics Agency

John Christensen john_christensen@hq.dla.mil
(703) 767-1415 fax (703) 767-1327 www.dla.mil

Ken Urtel kenneth_urtel@hq.dla.mil
(703) 767-1509 fax (703) 767-1327

Harvey Hanson hanson@spawar.navy.mil
(619) 553-2674 fax (619) 553-1060

◆ Defense Supply Center Columbus

David Robinson david_robinson@dsccl.dla.mil
(614) 692-7493 fax (614) 692-1611

Tom Beckstedt thomas_beckstedt@dsccl.dla.mil
(614) 692-0660 fax (614) 692-1753 www.dsccl.dla.mil

◆ Sarnoff Corporation

Justine Corboy jcorboy@sarnoff.com www.gemes.com
(609) 734-2168 fax (609) 720-4952 www.sarnoff.com



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